What is claimed is:

1. An apparatus for cryptographing an image, comprising:

an image segmenting unit that segments an input binary image into images;

a random image generating unit that generates as many random images as the segmented images;

a cryptographing unit that performs XOR operations on the segmented images and the random images on a one-to-one basis to produce as many cryptographed images as the segmented images; and

a phase card generating unit that assigns phase values of π and 0 to black and white pixels of the cryptographed images to generate phase cards corresponding to the cryptographed images.

2. The apparatus of claim 1, wherein the random image generating unit comprises:

a first random image generating unit that generates first random images 1 less than the number of segmented images; and

a second random image generating unit that performs XOR operations on the first random images to generate a second random image.

3. The apparatus of claim 1, wherein the phase card generating unit etches a transparent medium covered with an etchant to thicknesses corresponding to the phase values assigned to the black and white pixels of the cryptographed images to generate the phase cards.

4. The apparatus of claim 3, wherein the phase card generating unit determines the thicknesses of the phase cards using Equations below:

$$D = \frac{\lambda\phi}{2\pi(n-1)}$$

wherein λ denotes a wavelength of light transmitting through the phase cards, Φ denotes a phase value to be expressed, and n denotes a refractive index of the transparent medium of which the phase cards are made.

5. A method of cryptographing an image, comprising:

segmenting an input binary image into images;

generating as many random images as the segmented images;

performing XOR operations on the segmented images and the random images on a one-to-one basis to produce as many cryptographed images as the segmented images; and

assigning phase values of π and 0 to black and white pixels of the cryptographed images to generate phase cards corresponding to the cryptographed images.

6. The method of claim 5, wherein the generation of the random images comprises:

generating first random images 1 less than the number of segmented images; and

performing XOR operations on the first random images to generate a second random image.

7. The method of claim 5, wherein the generation of the phase cards comprises:

etching a transparent medium covered with an etchant to thicknesses corresponding to the phase values assigned to the black and white pixels of the cryptographed images to generate the phase cards.

8. The method of claim 7, wherein in the generation of the phase cards, the thicknesses of the phase cards are determined using Equations below:

$$D = \frac{\lambda\phi}{2\pi(n-1)}$$

wherein λ denotes a wavelength of light transmitting through the phase cards, Φ denotes a phase value to be expressed, and n denotes a refractive index of the transparent medium of which the phase cards are made.

9. An apparatus for deciphering an image, comprising:

a light source that outputs a linearly polarized beam with a short wavelength;

a polarized beam splitter that splits the linearly polarized beam into two linearly polarized orthogonal beams;

a first mirror that reflects a vertically polarized beam emitted from the polarized beam splitter through a first optical path;

a second mirror that reflects a horizontally polarized beam emitted from the polarized beam splitter through a second optical path;

a beam splitter that combines the vertically and horizontally polarized beams reflected from the first and second mirrors into a beam with a new polarization orientation; and

a polarizer that transmits only a one-orientation-polarized beam of the combined beam so as to decipher the image,

wherein phase cards are generated by assigning phase values of π and 0 to black and white pixels of cryptographed images so as to be respectively located in optical paths between the first mirror and the beam splitter and between the polarized beam splitter and the second mirror.

10. A method of deciphering an image, comprising:

splitting a linearly polarized beam with a short wavelength emitted from a light source into two linearly polarized orthogonal beams;

transmitting the two linearly polarized orthogonal beams through phase cards that are generated by assigning phase values of π and 0 to black and white pixels of cryptographed images and located in optical paths through which the two linearly polarized orthogonal beams pass;

combining the two linearly polarized orthogonal beams, which have passed through the phase cards, into one polarized beam with a new polarization orientation; and

transmitting only a one-orientation-polarized beam of the combined polarized beam so as to decipher the image.